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# **Technical Work Group Status Report**

**New Hampshire Climate Change Policy Task Force**

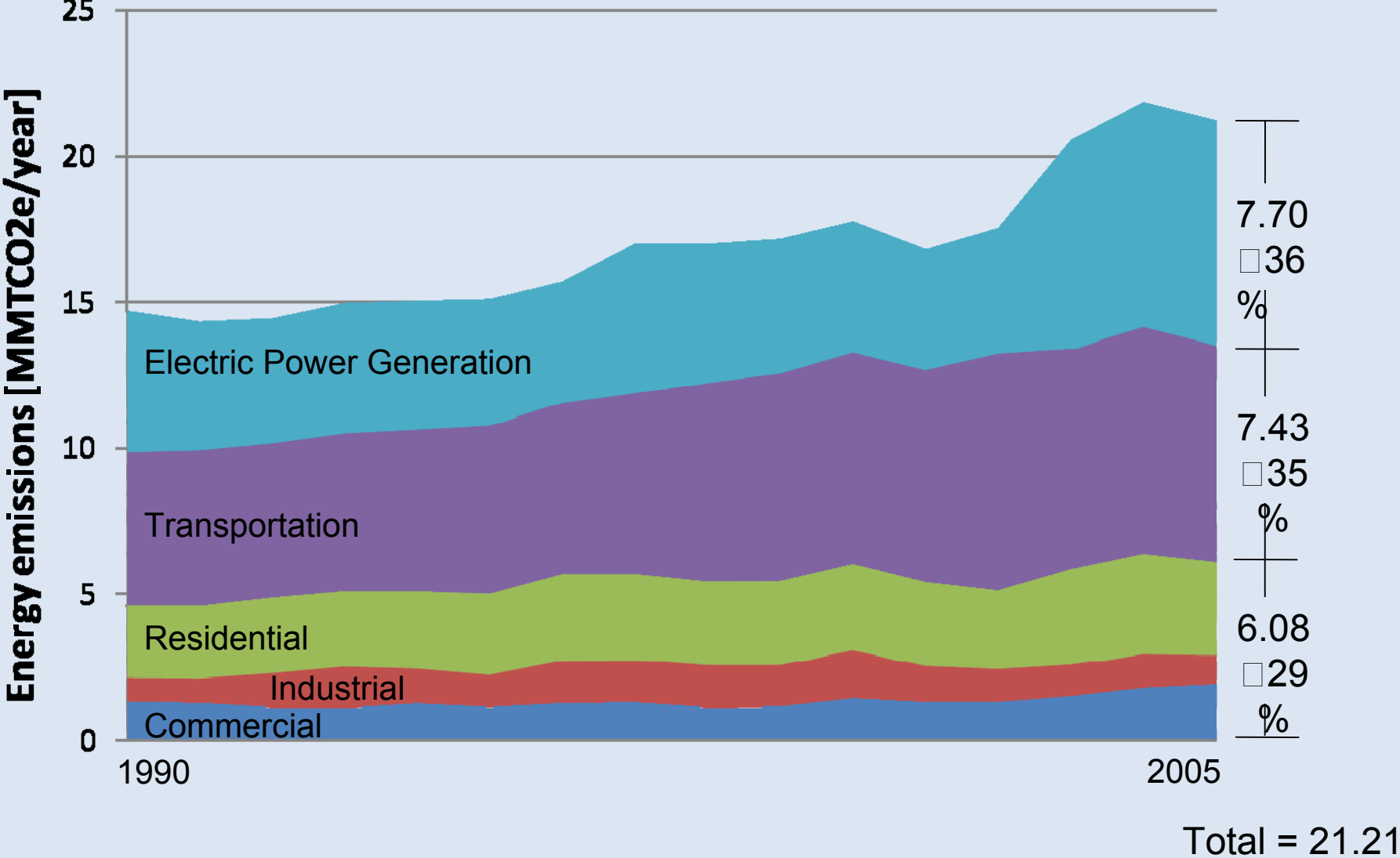
**Third Task Force Meeting  
May 19, 2008**

**Dr. George Hurtt  
Matt Frades  
Matt Magnusson**

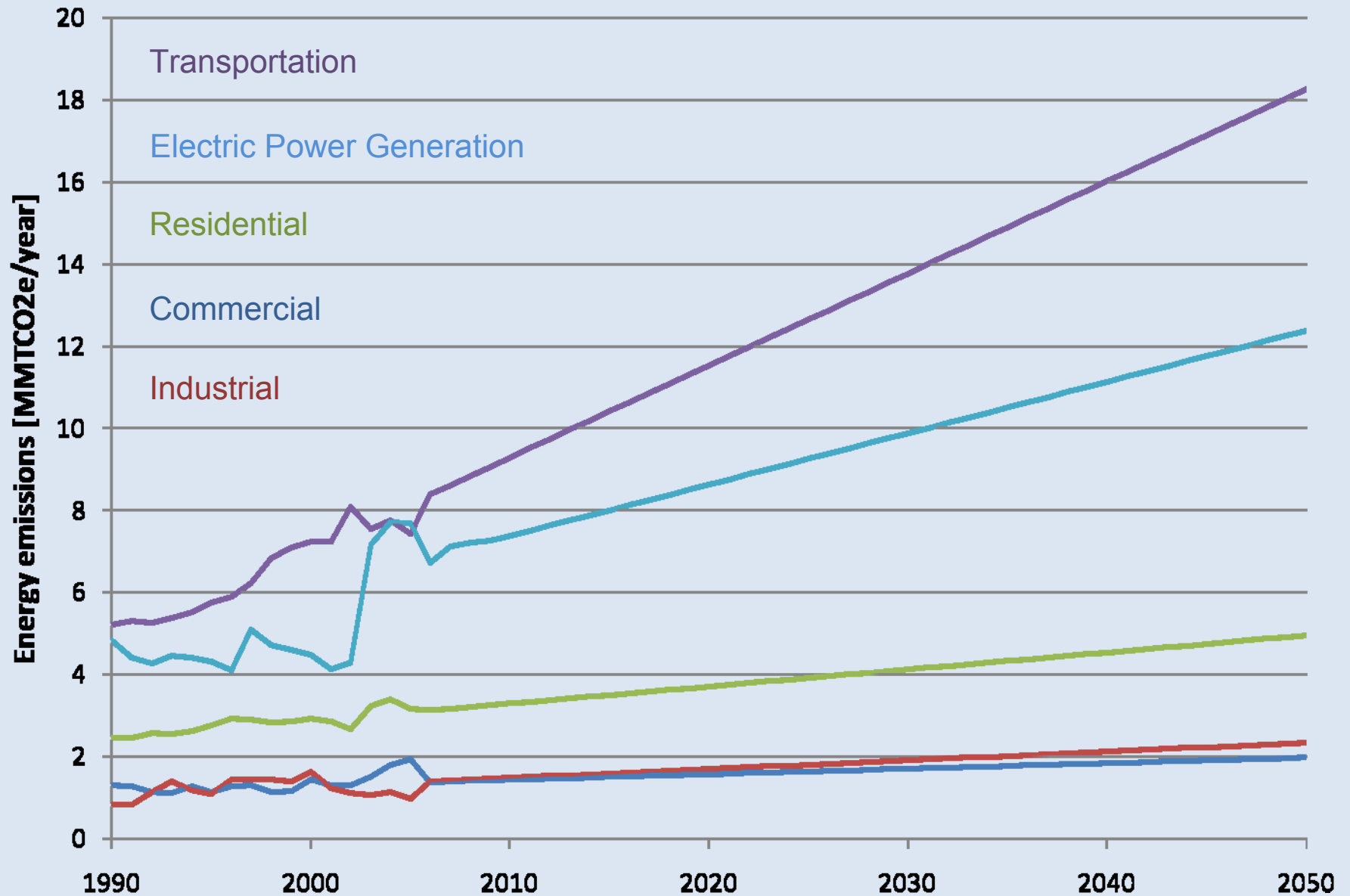
# Technical Consultant Charge:

- The CSNE technical consultant team will serve as a neutral and expert group to inform and support the development of technical and policy consensus
- The Technical Consultants' primary function is to provide technical support to the Task Force and Working Groups, including quantitative analysis of options and alternative policy designs.

# Historical NH Energy Emissions



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Data Sources: EPA, Energy CO<sub>2</sub> Emissions by State, 2017

# Electricity Generation and Usage

- **Model:**

- Based on projection of future generation (MWh) and fuel mix

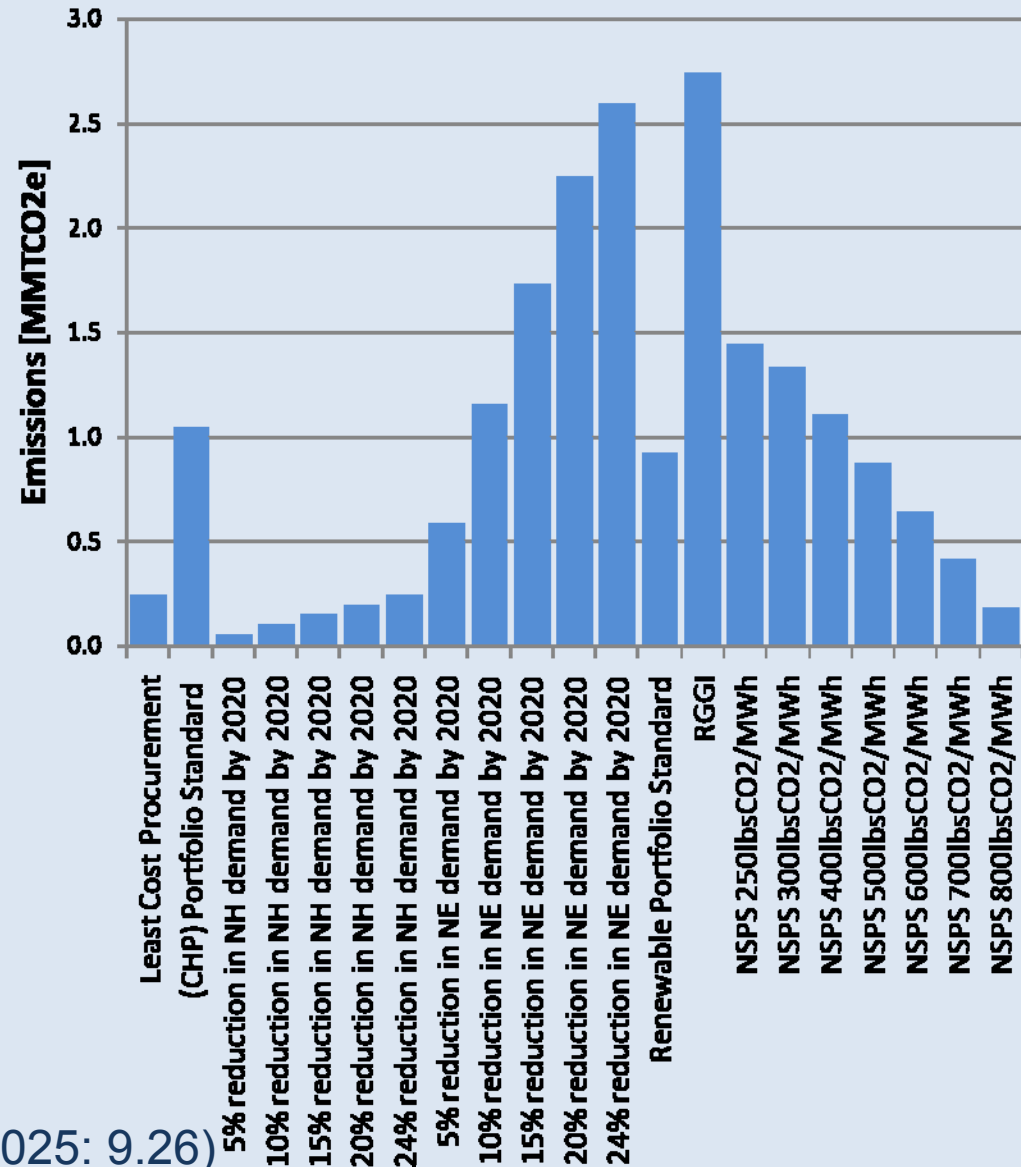
- **BAU:**

- Maintain current NH generation base
- Linear projection of NE generation growth, NH maintains 17.3% share
- New generation from natural gas

- **Analyses:**

- Phased in shifts in fuel mix
- Changes in new generation growth rate and fuel mix

## Avoided Emissions (2025)



(Total emissions in 2025: 9.26)

# Transportation and Land Use

- **Model:**

- Light Duty fleet:

- Cars / trucks
- Vehicle age
- Sales rate / retirement rate
- Vehicle miles travelled
- Fuel efficiency
- Fuel carbon intensity

- Heavy Duty fleet:

- Single unit / combination
- Miles travelled
- Fuel efficiency

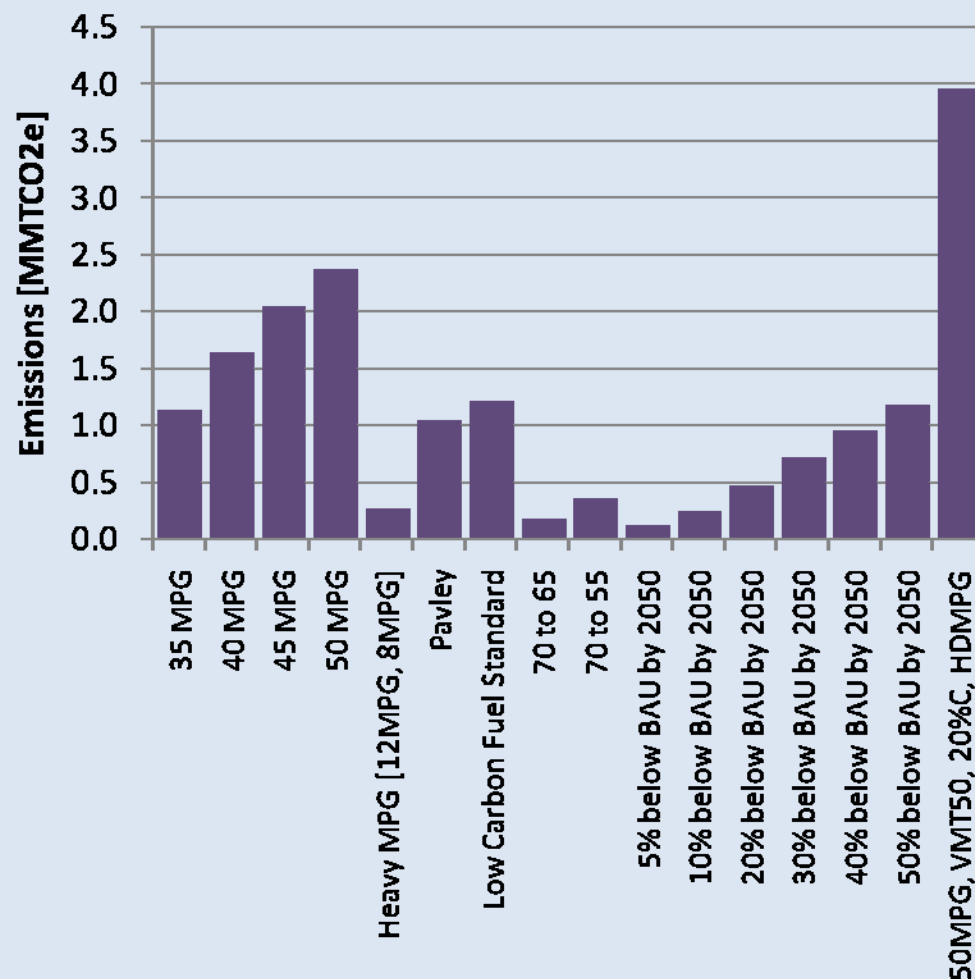
- **BAU:**

- Projections on current trends in above variables

- **Analyses:**

- Changes in efficiency, fuel carbon content, and VMT

**Avoided Emissions (2025)**



(Total emissions in 2025: 12.66)

# Residential, Commercial, Industrial

- **Model:**

- Based on energy intensity (per capita / per sq ft) and NH population and floorspace growth
- Apply a fuel mix to meet this energy demand

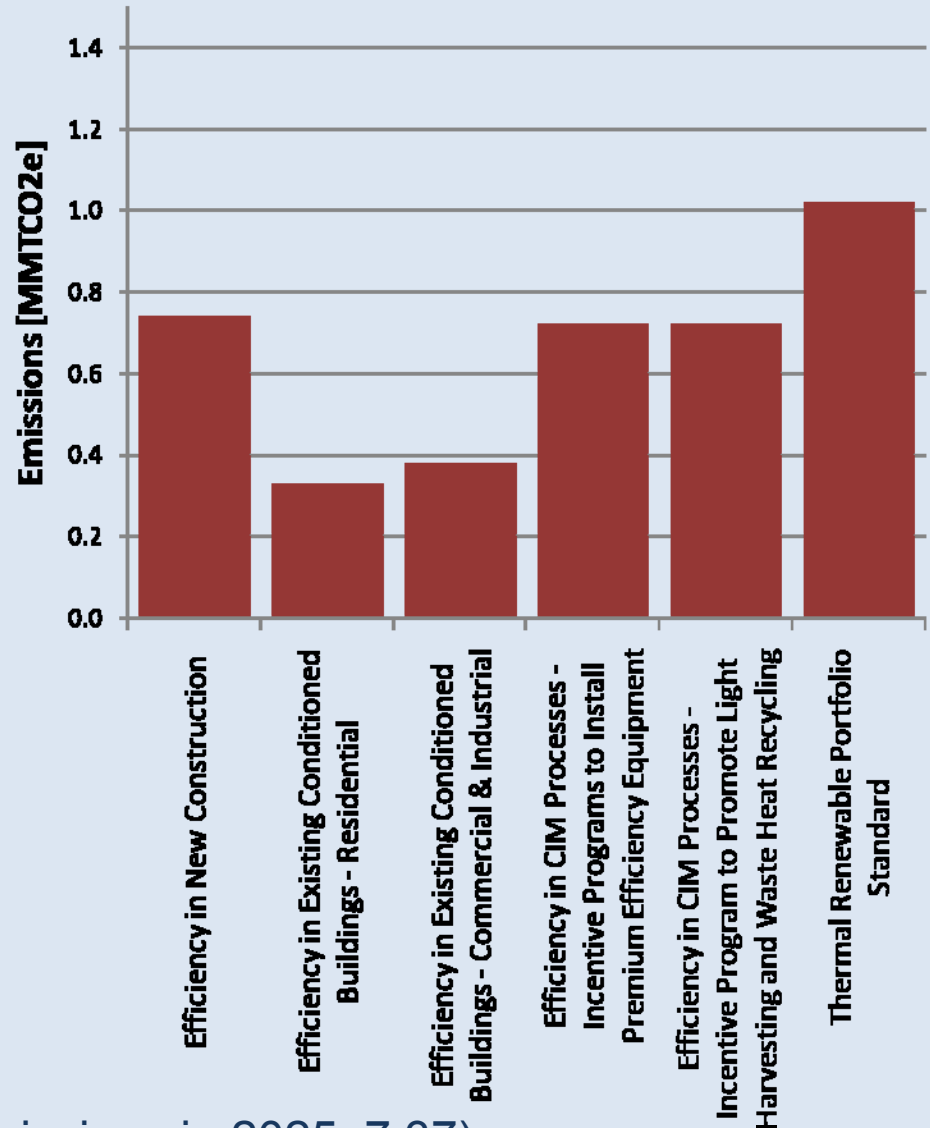
- **BAU:**

- Maintain current energy intensity and fuel mix and apply to growing population and floorspace

- **Analyses:**

- Apply phased-in changes in energy intensity to new, renovated old buildings
- Change fuel mix

**Avoided Non-Electric Emissions (2025)**



(Total emissions in 2025: 7.37)

# Agriculture, Forestry, and Waste

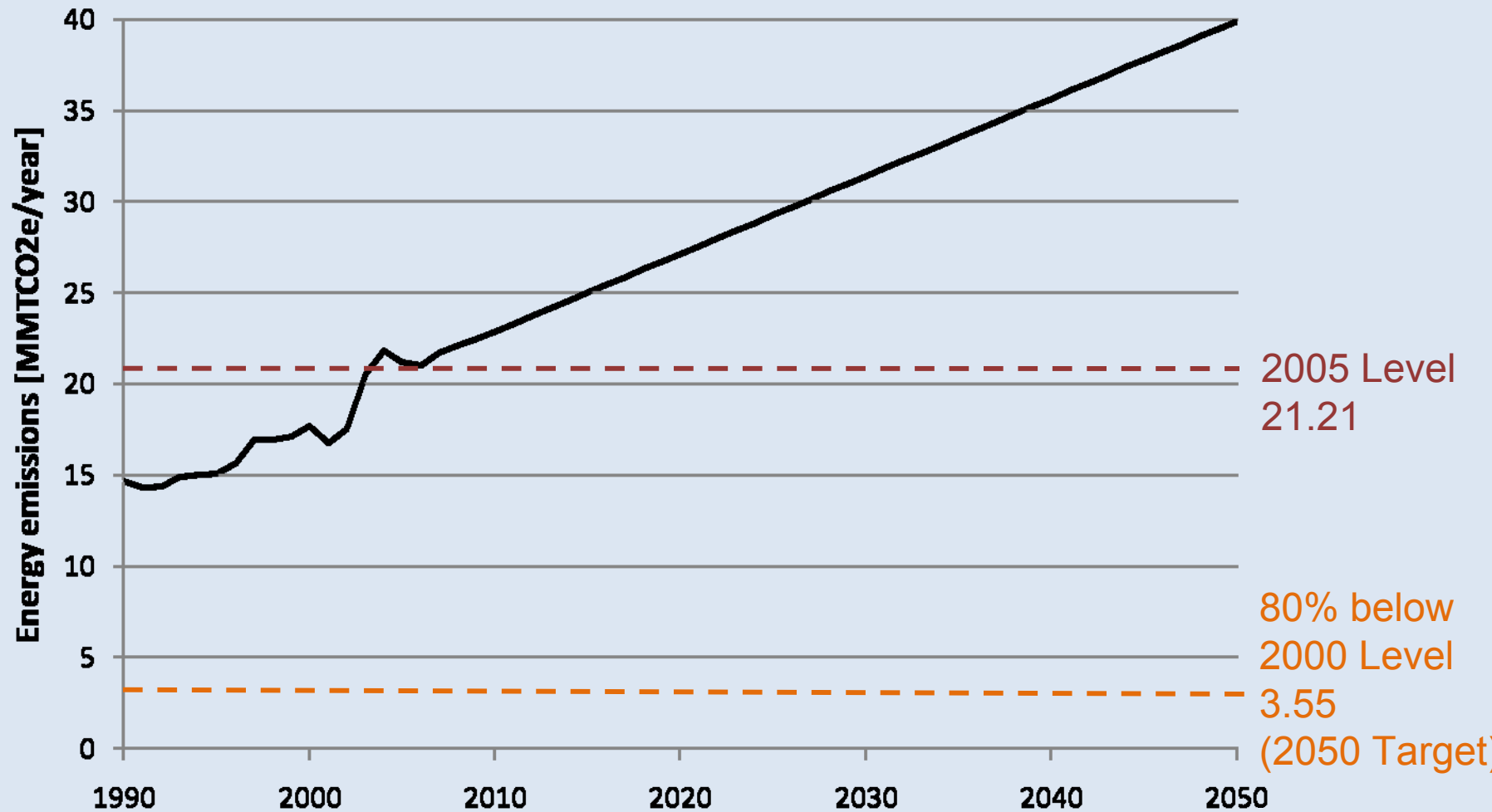
## Sustainable Wood for Energy

Energy

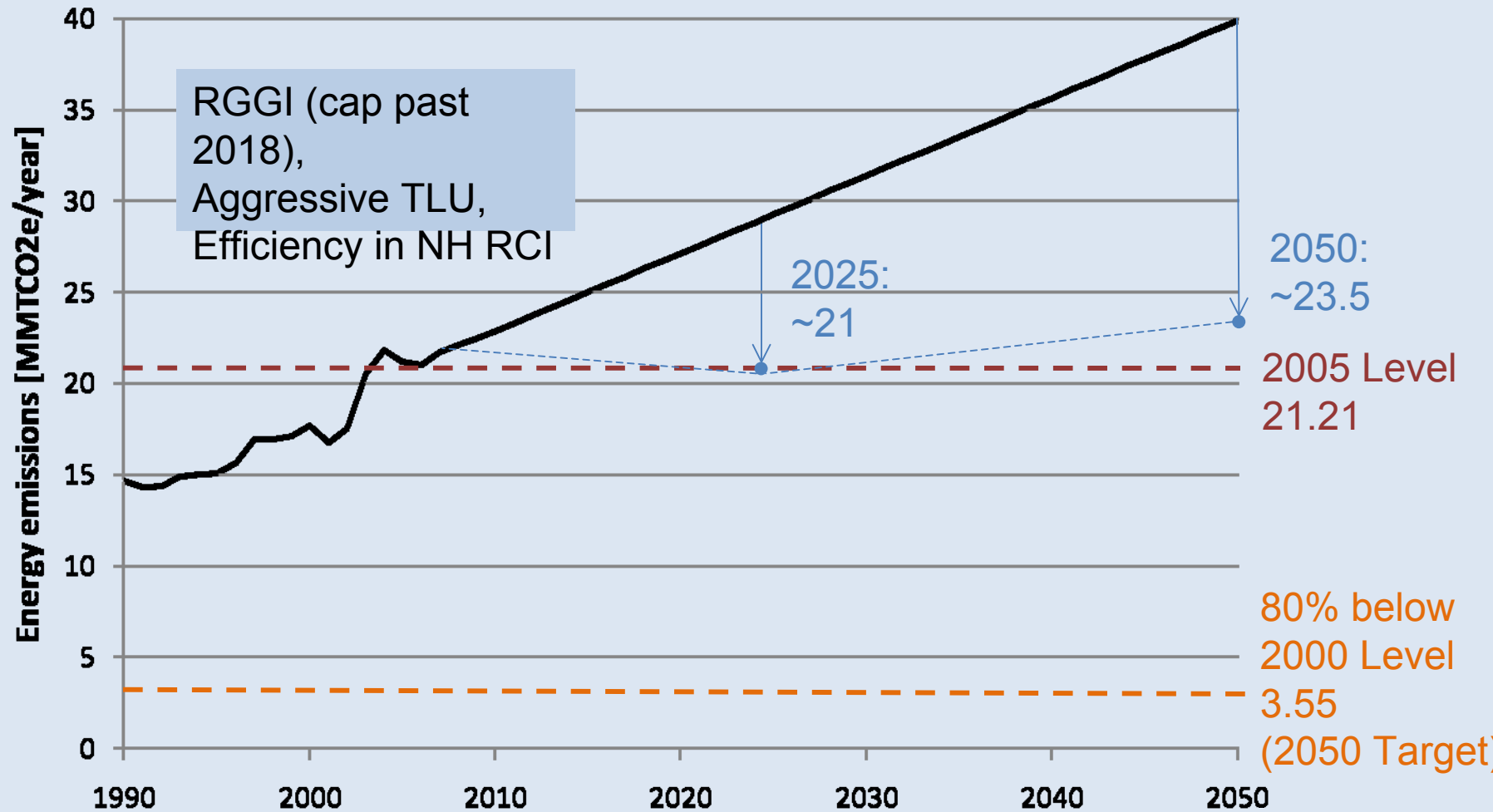
				Current Average Heat Rate (12,687 BTU/kWh)			Theoretical Efficient Heat Rate (9,000 BTU/kWh)		
				Electricity Generation	Percent of Total NH Generation	CO2 Offset	Electricity Generation	Percent of Total NH Generation	CO2 Offset
Increment + Harvest			55449	4,370,267	20.2%	1.74	6,161,000	28.5%	2.45
	Less Harvest		28845						
Unharvested			26604	2,096,820	9.7%	0.84	2,956,000	13.7%	1.18
	Less Restricted	50%	13302						
Available Unharvested			13302	1,048,410	4.9%	0.42	1,478,000	6.8%	0.59
Additional Number of 50MW Wood Plants				2.5			3.5		



# Preliminary Combination of Actions: Perspective on Overall Reductions



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# **Preliminary Combination of Actions: Perspective on Overall Reductions**

- I. Strategies have been identified and quantified wherein existing technologies could be implemented to substantially reduce future carbon emissions from NH.
- II. Estimates of avoided future emissions are preliminary and based on a rapid analysis of the best available information.
- III. Aggressive strategies in each of these sectors could avoid ~8.25 MMTCO<sub>2</sub>e emissions by 2025 and offset projected future growth.
- IV. These same strategies applied regionally might have a larger impact on region emissions since NH has among the fastest growth rates, and the cuts here go largely to offsetting future growth.
- V. Given projected growth rates additional strategies will be needed for the state to substantially reduce emissions below current levels.

# Economic Analysis Overview

- UNH Economic team consists of Professor Ross Gittel and Matt Magnusson, MBA
- Previous related research include:
  - Economic Impact Analysis of a Renewable Portfolio Standard on NH (2006)
  - Economic Impact Analysis of the Regional Greenhouse Gas Initiative on NH (2008)
- For this project we seek to assist and inform the task force by:
  - Providing a broad assessment of the direct costs and benefits of various policies proposed by the working groups
  - Providing expected statewide economic impacts (e.g. Employment, Gross State Product)

# Methodology Overview

- Research the policies proposed by the working groups to find economic metrics (cost of implementation, savings expectations) from credible sources (e.g. EPA, EIA)
- Document assumptions that are being used in the economic analysis
- Integrate the economic spreadsheet modeling with the output of the carbon spreadsheet modeling performed by the carbon analysis team.
- Economic analysis driven by the demand forecasts developed by the carbon team
- Economic team developed energy price forecast through 2050 based on:
  - EIA Annual Energy Outlook for 2008 for all fuels but not electricity
  - ISO New England 2008 forecast for NH specific electricity prices
- Statewide economic impacts will be modeled using spreadsheet analysis and our knowledge of the NH economy and may include more sophisticated economic software tools such as REMI (Regional Economic Modeling)

# Electricity Generation & Usage

- Economic analysis of direct costs and benefits have been completed for policies proposed by the EGU working group
  - Direct Costs: Capital and operating costs to implement technologies
  - Direct Benefits: Savings to NH ratepayer costs
- The policies analyzed focused on:
  - Increased use of Energy Efficiency and Demand Reduction
  - Increased generation from Combined Heat and Power
  - Carbon sequestration for new generation
- Key findings include:
  - Investment in Energy Efficiency (depending on the policy) could result in up to \$150 million in new investment annually by 2050 and annual savings of \$700 million to NH ratepayers
  - Combined Heat & Power policies could to \$200 million in new investment annually by 2050 and annual savings of \$500 million to NH ratepayers

# Transportation and Land Use

- Economic analysis of direct benefits have been completed for policies proposed by the TLU working group
  - Direct Costs: (Looking for further feedback from TLU on implementation costs)
  - Direct Benefits: Savings due to avoided fuel costs
- Key findings include:
  - More stringent CAFE (Fuel Economy) standards could save NH drivers up to \$1.2 billion annually by 2050 in avoided fuel costs
  - Reducing highway speed could save \$150 million in fuel costs by 2050
  - Reducing VMT (Vehicle Miles Traveled) by 50% could save \$1.3 billion annually by 2050

# Residential, Commercial, Industrial

- Economic analysis still in progress for policies proposed by the RCI working group
  - Direct Costs: (Looking for further feedback from RCI on implementation costs) based on additional cost per square foot per policy
  - Direct Benefits: Savings due to avoided fuel costs based on per square foot
- Current status
  - Linking economic modeling with carbon modeling demand forecasts based on square footage per sector
  - Developing cost/benefit curve for energy efficiency in buildings. Research indicates a non-linear curve.



# Agriculture, Forestry, and Waste

- Economic analysis has not begun for this group
  - Direct Costs: (Looking for further feedback from AFW on implementation costs)
  - Direct Benefits: (Looking for further feedback from AFW on implementation costs)
- Current status
  - Not enough information to guide economic analysis

# Next Steps

- Actively looking for further feedback (specifically for cost/benefit data) from working groups to assist with completing analysis of direct costs and benefits from proposed policies
- Upon completion of the analysis of direct costs and benefits for the policies that can be analyzed, the economic team will provide broader economic impacts for these policies
- Economic team is also performing related research to develop detailed estimates of energy efficiency potential for NH and a more detailed supply/demand curve for renewable energy for NH that can be used to refine the economic analysis performed for the EGU and RCI policies